Enabling eGov using eXtensible Markup Language (XML) based standards

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VISION

• Improve service quality to Canadian people and businesses by:
  • implementing client-focused, integrated, accessible and cost-effective electronic services at all levels.

TARGET

• Leverage the power of XML to deliver those services via collaboration, across jurisdictions.
XML enables eGov

- Standard based format and protocol, i.e. SOAP, HTTP, TCP/IP
- Content definition - subject area XML schema such as name, address
- Semantic vocabulary for defining business rules, i.e. government program, services, transaction and message choreography, e.g. GML, HL7, ebXML
- The above will enable federated Portal, Enterprise Application Integration, Metadata exchange etc.
Benefits of national standards

- Enable the efficient interchange of data within jurisdiction and inter-jurisdiction
- Enables G2G collaboration across jurisdictions using common semantic rules based on a common information model
- Enables G2G service delivery infrastructure by utilizing a central XML Registry (UDDI or ebXML)
Interjurisdictional collaboration

Electronic Service Delivery

Government Of Canada

Other Provincial and Municipal Governments

Provincial Government

Foreign Governments

Citizen

Business

G2G

G2G

G2C

B2C

G2B

B2B
Part I: Concrete Utilization

1. Recap of XML
2. XML utilization (e.g. Nunavut)
3. Standardized approach to XML

Part II: Architecture driven Implementation

1. Benefits of standards (cont’d)
2. Common Data Elements
3. Key issues
4. Areas of collaboration
Part I: Concrete Utilization

1. Recap of XML
2. XML utilization in Nunavut
3. Standardized approach to XML
Recap of XML

• Self-describing data
  – XML markup describes itself and the data

• Plain text
  – Allows cross-platform utilization
  – All OS and development platforms

• Family of languages for describing
  – data (XML documents/instances)
  – data structure (XML Schemas)
  – data conversion (XSL Transforms)

• eXtensible: no lock-in, always able to add extensions
Part I: Concrete Utilization

1. Recap of XML
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3. Standardized approach to XML
Who we are

• Canada’s newest Territory
  – Territorial scope for service provision
• Young jurisdiction
  – 4 years old
• Large land area
  – 1/5th of Canada
• Scattered population
  – 27,000 people, in 26 communities

• Significance: extremely scarce resources
• Many of our original sources are “flat” documents:
  – Acts
  – Statutes
  – Regulations
  – Policies
  – Business Plans

• Applications need to access the data
  – Preferably with a minimum of human interaction
  – Preferably with a scalable, repeatable method

• One solution:
  – Well-styled MS Word document
    • Paragraph and Character styles
    • SaveAs HTML
  – Convert to well-formed XML (xhtml)
    • e.g. suite of “Tidy” applications (OSS)
  – Convert to valid XML
    • Via XSL Transformations
Where is our data – COTS Apps

- Commercially Off-The-Shelf (COTS) Applications
- Restricted ability to modify
  - Vendor Applications
  - COTS Database Structures
- Data sharing only via custom interfaces
  - Many potential solutions, but
  - A standardized way allows us more efficient utilization of our (very scarce) resources
- COTS Business Vocabularies
  - drive the definition of structure
    - UML Classes and XML documents
- Integration always a factor
  - Several Sources
    - Core/Payroll/EFT all separate apps
  - Several Platforms
    - e.g. MSSQL7 on Win2k, or Oracle8 on HPUX
  - Personalization Requirements
    - Departments need to look at same data in different formats
Information Models

- Text Documents
- MSSQL 7 and Oracle 8 databases
  - Derived Entity Relationship Diagram
  - Reverse Engineering (Physical to Logical):
    - Tables to Classes
    - Database to Components
    - Package to Schema
    - Columns to Attributes
    - Relationships to Associations

- UML Class View
UML Class View

Diagram: with the assistance of ArgoUML v0.12
Information Models

UML Class to XML Schema View
<?xml version="1.0" encoding="UTF-8"?>
  <xs:include schemaLocation="GNBusiness.xsd"/>
  <xs:include schemaLocation="GNProgram.xsd"/>
  <xs:element name="GN_Business_Plan">
    <xs:annotation>
      <xs:documentation>Schema to describe GN Business Plans</xs:documentation>
    </xs:annotation>
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="gnb:TableOfContents"/>
        <xs:element name="Introduction" type="gnb:IntroductionType"/>
        <xs:element name="Enviro_Scan" type="gnb:Enviro_ScanType"/>
        <xs:element name="CoreBusinesses">
          <xs:complexType>
            <xs:sequence>
              <xs:element name="CoreBusiness">
                <xs:complexType>
                  <xs:complexContent>
                    <xs:extension base="gnb:BP_CoreBusinessType">
                      <xs:sequence>
                        <xs:element name="Programs">
                          <xs:complexType>
                            <xs:sequence>
                              <xs:element name="Program" type="gnb:BP_ProgramType"/>
                            </xs:sequence>
                          </xs:complexType>
                      </xs:sequence>
                    </xs:extension>
                  </xs:complexContent>
                </xs:complexType>
              </xs:element>
            </xs:sequence>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
XML for data interchange
- Provides a standard way to “markup” data
- Can “markup” data from any source, from RDBMS to MSWord
- Allows us to create a standard method or procedure for:
  - Marking up a data source
  - Consuming that data

This could be better:
- Currently, the interface must understand every Schema
Part I: Concrete Utilization

1. Recap of XML
2. XML utilization in Nunavut
3. Standardized approach to XML
• Non-standardized, or one-to-one mappings
  – Work perfectly well, as one-time setups
    • Reverse-engineer, map structures, tag data
  – Becomes just another means of data exchange
  – No advantage over proprietary methods

• Standardized, or common structures/vocabularies
  – One-to-one mappings between the individual system and the common vocabulary/schema still need to occur
  – However, after that initial setup, individual systems are decoupled from their data structures
  – Any new applications/interfaces can be built from common components, to exchange data via one central, common structure
Standardized Approach

One common structure (XML Schema) with vocabulary common to all individual Schemas

No knowledge of individual source structures
Common Vocabulary

• Need for a common Business Vocabulary in the GN
  – Multiple sources in a unified view required by all Departments
  – Disaggregating large pieces of information into their parts
  – Filtering the content to a subset required by a particular Departmental or User context
  – Restructuring the Information for an Application User’s View
  – Formatting the Information for presentation to the user or Departmental View

• Interdepartmental business processes make this a priority

• XML provides unique help towards collaboration
  – provides a common approach
  – accepted industry-wide
  – truly cross-platform, in all senses
  – inherently flexible (eXtensible)
eXtensibility

- Packages
  - The GN creates/maps the package structure of its applications

- Namespaces
  - Generally, those map to XML namespaces

- No restrictions
  - There are no limitations on the data structures
Where possible, we act “lazily”
- never reinvent the wheel
- instead, reuse the work of others
- extend/restrict as necessary
  (in turn, modifications are shared)
Inter-Jurisdictional framework

• Theoretically
  – increase cost-effectiveness
    • external data-sharing
    • internal data-sharing
  – possible with the eXtensibility inherent to XML

• Practically
  – Ontario’s CDEM and CDES moving to provide a solution
    – already used by GN at a level of Row 2 (Zachman Framework)
Part II: Architecture driven Implementation

1. Benefits of standards (cont’d)
2. Common Data Elements
3. Key issues
4. Areas of collaboration
## Multi-layered eGov Framework

<table>
<thead>
<tr>
<th>Category</th>
<th>Technology/Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Process Definition</td>
<td>ebXMLBPSS</td>
</tr>
<tr>
<td>Business Process Content / Vocabulary</td>
<td>ebXML Core Components</td>
</tr>
<tr>
<td>Business Documents, Messages</td>
<td>XML Schemas</td>
</tr>
<tr>
<td>Registry, Repository</td>
<td>ebXML RegRep</td>
</tr>
<tr>
<td>Trading Partner Profile &amp; Agreement</td>
<td>UDDI</td>
</tr>
<tr>
<td>Business Protocol, Messaging</td>
<td>ebXMLCPP/CPA</td>
</tr>
<tr>
<td>Technology/Infrastructure</td>
<td>ebMS(ebXML)</td>
</tr>
<tr>
<td></td>
<td>XML, Schema, HTTP, XML, HTTPS ...</td>
</tr>
</tbody>
</table>
At Ontario Government

- Reference Information Model for Government to Government collaboration
- Standardized definitions of common data elements (CDE) developed to foster sharing and re-use
- Standard schema definition of name & address - Common Data Element Schema (CDES)
- Prototype key component of XML based service delivery infrastructure, i.e. ebXML Registry and UDDI directory
Part II:
Architecture driven Implementation

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CDEM and CDES milestones

• Version 1.7d released in May 2002
• Version 1.8 completed in February 2003 based project feedback
• Version 2.0 to be completed by end of September 2003
Major enhancements to V2.0

- Alignment with International standards, i.e. xNAL (OASIS), GDF (ISO)
- Optimize schema design based on application and performance requirements
- Ongoing training & support
Project implementations of CDEM & CDES 1.7d

- Electronic Service Delivery for Individuals
- Ontario Student Information System
- Apprenticeship Support System
- Inquiry Services and Status Information
- Revenue Management System
- Medical Update
- RUS data warehouse
- MNR: alignment with Ontario Road Network, Land Parcel project
Purposes of Reference Information Model

- High-level view of generic government information structure for program, service, process
- Formal information taxonomy
- Foundation of inter-jurisdictional Information Management
- Basis for development of semantic rules
Part II: Architecture driven Implementation

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Project Findings

- Project Findings related to XML Service Delivery Infrastructure:
  - existing XML IDE tools like XML Spy and Turbo XML support manual creation of BPS, CPP, and CPA
  - overall ebXML compliant technology and tools market is immature:
    - lack of IDE tools for automatically generating BPS, CPP, and CPA
    - some important features missing from GoXML. e.g. JAXR client
OASIS eGov Tech Committee

• To voice OPS needs and requirements with respect to XML-based standards.
• To communicate with many other governments, such as UK, USA, Australia, Finland, Denmark, Germany...
• To share the best practice with international community, OPS ebXML registry/repository prototype has been published as a case study
• To work with other OASIS channels and other international standards bodies’ channels.
• ensure alignment with most current open standards.
Key Issues

- Maturity of foundation XML standards
- Clear directions on Web Services and ebXML
- Maturity of products to support infrastructure, eg. XML Registry
- Government of all levels to agree on a single set of schema standards
Part II: Architecture driven Implementation

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Towards national standards

• Active at OASIS eGov Technical Committee
• BC government dialogue
• Federal government - gol, TB participation
• Municipal government - MISA participation
• Nunavut collaboration
Areas to Collaborate

- Jointly develop and agree on a set of Common Data Elements based XML standard schemas for G2G data interchange

- Agree on a Canadian reference Information model for Program and Services for submission to OASIS eGov TC
Supplementary material (on CD)

- Reference Information Model for Government Program and Services
- Common Data Elements Model
- Common Data Elements Schema
- Data Model driven method for XML schema design
- GO-ITS Standards
Thank You

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